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## Diabetes and the Uninsured in Montgomery County, Ohio: Effects of a County-Funded Health Services Program on Hemoglobin A1c Values

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Diabetes and the Uninsured in Montgomery County, Ohio:  
Effects of a County-Funded Health Services Program  
on Hemoglobin A1c Values

Mark Feighery

Wright State University

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### **Acknowledgements**

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Montgomery County Care (MCC) was an innovative program created from the vision of Mike Ervin, MD, and others who served on the county's Healthcare Safety Net Task Force. It became a reality through the leadership of the Montgomery County Commissioners (Judy Dodge, Dan Foley and Debbie Lieberman) and former County Administrator Deborah Feldman. County Health Commissioner Jim Gross, MPH, who served as the chair of the MCC advisory board; Gregg Hopkins, Executive Director of the Community Health Centers of Greater Dayton; and Tom Kelley, Assistant County Administrator for Human Services, provided indispensable counsel and support to me during the time I managed MCC.

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## Table of Contents

Abstract .....	4
Introduction .....	5
Statement of Purpose .....	6
Review of Literature .....	6
The Human and Financial Cost of Diabetes.....	6
Assessing the Health of People with Diabetes .....	8
A Basis of Comparison: The Role of Medicaid and Medicare .....	9
Assessing Health Programs and Clinical Outcomes .....	10
Health Programs and the Uninsured.....	16
Race and Ethnicity in Health Outcomes.....	22
MCC Member Demographics .....	23
MCC Program Services .....	23
Methods.....	24
Results .....	26
MCC Members, Diabetes and Gender .....	30
MCC Members, Diabetes and Race .....	30
MCC Members, Diabetes and Age .....	31
Discussion .....	32
Limitations .....	41
Conclusion .....	42
References .....	44
Appendices.....	51

### Abstract

Montgomery County Care (MCC) was a county-funded, limited benefit health services program launched in 2010 as a bridge to expanded Medicaid and the health insurance marketplaces for the uninsured of Montgomery County, Ohio. A principal goal was to help manage chronic disease, particularly diabetes. Approximately 20% of the MCC members assigned to a community health center were diagnosed with diabetes. Paired sample t-tests of Hemoglobin A1c values were compared for diabetic members enrolled in the program for a minimum of one year. Among 188 members for whom initial and subsequent values were recorded, HA1c values declined (showed an improvement) from a mean initial value of 8.63 to 8.04. Mean HA1c values declined across categories of gender, race and age. Overall, however, the mean subsequent value of members enrolled in the program for more than one year was higher than the goal established by the American Diabetes Association as a standard of care. These members continued to be at risk for complications from diabetes.

*Keywords:* community health center, Federally Qualified Health Center, health outcomes, Affordable Care Act, Medicaid.

**Diabetes and the Uninsured in Montgomery County, Ohio: Effects of a County-Funded  
Health Services Program on Hemoglobin A1c Values**

Montgomery County Care (MCC) was established in 2010 as a limited-benefit health services program for uninsured adult county residents not eligible for Medicaid. Eligible applicants were at least 19 but not yet 65 years old. The program responded to a need identified in the Ohio Family Health Survey (2008) that 17.9% of Montgomery County adults age 19-64 lacked health insurance as of 2008. Upon enrollment, approximately 90% of MCC members declared incomes of less than 138% of the Federal Poverty Level (\$15,856 for a single person). More than half reported they had been uninsured for at least four years when they joined the program.

Funded by the Montgomery County Human Services Levy, MCC was intended to be a bridge to expanded Medicaid and the health insurance marketplace under the Affordable Care Act. The principal program goals were to provide a primary care medical home, help manage chronic conditions such as diabetes and cardiovascular disease, and reduce unnecessary emergency department usage. At the program's membership peak in July 2013, approximately 3,600 members received primary care through the Community Health Centers of Greater Dayton (CHCGD) or Five Rivers Health Centers (FRHC). CHCGD and FRHC are Federally Qualified Health Centers that receive federal grant funding and enhanced reimbursement from Medicaid and Medicare for providing care for underserved populations. CareSource, a Medicaid managed care organization based in Dayton, administered MCC.

Among the chronic diseases that MCC was intended to address, diabetes has grown in significance. The Public Health – Dayton & Montgomery County (2010) Community Health Assessment 2010 identifies it as the seventh leading cause of death in the county. One out of

every five county residents over the age of 65 has diabetes. Disturbingly, the county has highest rate of diabetes in Ohio. The prevalence of diabetes among Black/African-American residents of the county is twice that of White/Caucasian residents. Overall within the county, the incidence of diabetes among adults age 18 and older was 13.1% in 2007-08. Incidence rose to 18.1% for those age 55-64.

After nearly four years and an expenditure of \$4 million, did MCC improve the health of its members with diabetes? This study encompasses MCC members, enrolled for a minimum 12-month period, who were assigned to FRHC and diagnosed with diabetes. It compares initial and subsequent Hemoglobin A1c (HA1c) values as an assessment of their diabetic health status.

### **Statement of Purpose**

This study sought to answer the following question: for members with diabetes, did MCC improve their blood sugar control? The program provided access to regular consultation with a primary care provider, periodic HA1c testing, and oral diabetes medications and/or insulin. In the aggregate, did these factors make a difference? HA1c values were compared to gauge variation in health status.

### **Review of Literature**

#### **The Human and Financial Cost of Diabetes**

How severe a condition is diabetes? Gregg et al. (2013) identify it as the leading cause of nontraumatic lower-extremity amputation, end-stage kidney disease, and blindness. It more than doubles the risk of heart disease, stroke, and disability. The American Diabetes Association (2013) estimated the total costs of diagnosed diabetes increased to \$245 billion in 2012 from \$174 billion in 2007. Care for people diagnosed with diabetes accounts for one in five healthcare dollars in the U.S. Significantly for the MCC population, people with diabetes who

lack health insurance have 79% fewer physician office visits and are prescribed 68% fewer medications than those with insurance coverage. Perhaps as a result of this lack of care, they have 55% more emergency department visits than those with insurance. Diabetes also increases the costs of treating conditions not directly related to the disease.

On an individual level, diabetes can be an expensive condition to manage. While some oral diabetes medications are inexpensive, insulin is not. There is no generic form. Diabetic test strips, used by those with diabetes up to several times each day to help manage their condition, are also costly. Yeaw, Lee, Aagren, and Christensen (2012) conducted a study of 45,555 patients with at least two claims for insulin during a 30-month period. Over this time, their pharmacy costs accounted for an average \$772 per patient in test strips and supplies and \$2,078 for insulin and supplies. With an overall mean utilization of 764 strips per year, the average cost per test strip was 98 cents. Such costs present a barrier to care for a low-income population not covered by Medicaid. For this reason, MCC waived copays for insulin and assessed a copay of \$5 for diabetic test strips. It is important to note that access to medication is not in itself a solution. Vigersky (2011) notes that one-third of patients with diabetes are nonadherent in their medications. Nonadherence patients have a HA1c level 0.5% higher than those who were adherent to oral diabetes medication.

How prevalent is diabetes? Geiss et al. (2012) show the 2010 age-adjusted prevalence for adults in Ohio to be 9.3%, up from 4.2% in 1995. The comparable U.S. levels were 8.2% (2010) and 4.5% (1995), so the disease has proportionately increased in prevalence in the state. Boyle, Thompson, Gregg, Barker, and Williamson (2010) forecast that the prevalence of diabetes among U.S. adults will reach between 21% and 33% by 2050.



**Assessing the Health of People with Diabetes**

This study used the HA1c test as a measure of health for a person with diabetes. The Mayo Clinic (2014) defines the test as reflecting the average blood sugar level for the preceding two to three months. The test measures the percentage of hemoglobin that is coated with sugar, or glycated. The higher the HA1c level, the poorer a person's blood sugar control and the higher their risk of diabetes complications. The American Diabetes Association (2011) refers to a HA1c level above 6.5 as a diagnostic criterion for diabetes. The Mayo Clinic recommends that those with diabetes obtain a HA1c test twice each year if they have type 2 diabetes, don't use insulin, and have a consistently normal blood sugar level. Those with type 1 diabetes are advised to have the test quarterly, as are those with type 2 diabetes who use insulin to manage their diabetes. People with diabetes typically check their blood sugar multiple times each day by lancing a finger with a spring-loaded needle device and applying a drop of blood to a test strip. A reading below 80 could potentially lead to a loss of consciousness, while repeated readings above 125 could lead to medical complications such as tissue damage.

This study does not distinguish between members with type 1 and type 2 diabetes. Type 1 diabetes is an autoimmune disease that requires daily injections of insulin (either through a syringe or pump). Insulin is sold under brand names that include Humalog, Humulin and Lantus. Persons with type 1 diabetes statistically comprise about five percent of all diagnosed adult diabetes cases (Centers for Disease Control and Prevention, 2014). It is irreversible. Type 2 diabetes is treated with either oral medications (sold generically under names that include metformin, glyburide and glipizide and under branded names that include Actos, Avandia and Januvia), insulin or both. In some cases, it can be reversed through changes in diet and physical activity. The author's 2013 study of all MCC members (those assigned to CHCGD as well as

FRHC) evaluated those who filled at least one prescription for a diabetes medication during 2012. Of these members, 60.9% used oral medications only, 20.8% used insulin only and 18.3% used both oral meds and insulin.

### **A Basis of Comparison: The Role of Medicaid and Medicare**

In evaluating MCC's role in helping to treat those with diabetes, it is necessary to place the program's limited benefit structure in the context of broader, more comprehensive health programs. Medicaid is jointly funded by the federal government and the states to provide health services for low-income people. While the federal government sets minimum guidelines for Medicaid eligibility, states can choose to provide coverage beyond this threshold. Medicaid covers doctor visits, prescription drugs, emergency department visits, outpatient procedures and in-patient hospitalizations. In Ohio prior to 2014, Medicaid covered children living in households below 200% FPL, parents of dependent children below 90% FPL, and pregnant women below 200% FPL. Under the Affordable Care Act, states had the option to expand Medicaid coverage effective January 1, 2014, to adults below 138% FPL, including those without dependent children. Kaiser Health News (2014b) reports that as of June 10, 2014, Ohio was one of 27 states to have implemented expanded Medicaid. Nationwide, 66 million Americans receive Medicaid benefits. These include approximately 2.2 million Ohioans, or nearly one out of five state residents. The Health Policy Institute of Ohio (2013) cited total Medicaid spending of \$17 billion across all Ohio agencies for fiscal year 2012.

Medicare provides comprehensive health services for Americans age 65 and older, as well as younger people with disabilities. It is comprised of Part A (hospital care), Part B (services such as doctor visits, outpatient surgery and lab tests) and Part D (prescription drug coverage). Unlike Medicaid, it is entirely funded and administered by the federal government.

According to Kaiser Health News (2014c), in 2012 Medicare provided health insurance to 54 million Americans. Ohio is home to nearly 2 million Medicare recipients.

### **Assessing Health Programs and Clinical Outcomes**

A wide variety of research, spanning four decades, has attempted to answer whether and how health coverage programs improve health. The research includes studies on the effectiveness of Medicaid, Medicare and private health insurance, as well as programs more limited in their scope. The results are decidedly mixed.

Baicker et al. (2013) and Levy and Meltzer (2004) are among those who failed to find correlation between health coverage and improved clinical outcomes. Lurie, Ward, Shapiro, and Brook (1986), Bernstein, Chollet, and Peterson (2010), Wilper et al. (2009), He et al. (2002), Shen and Washington (2006), Rothkopf, Brookler, Wadhwa, and Sajovetz (2011), and Glendenning-Napoli, Dowling, Pulvino, Baillargeon, and Raimer (2012) conclude the opposite – that health coverage can be shown to positively affect health outcomes. In the middle are researchers whose studies were inconclusive or report a blend of positive and negative correlation. They include Zhang et al. (2009), Card (2009), Belue, Figaro, Peterson, Wilds, and William (2014), and Waits, Reames, Sheetz, Englesby, and Campbell (2014).

Research by Baicker and colleagues (2013) coincided with state legislative debates on whether to expand Medicaid as provided for in the Affordable Care Act. Baicker et al. (2013) explored the relationship between health coverage and health outcomes. Their findings -- that enrollment in the Oregon Medicaid program did not improve key health indicators such as HA1c, blood pressure and cholesterol levels -- stunned many.

While approximately 90,000 low-income adults qualified for the expansion, Oregon had only enough money to cover one-third of those eligible. The Oregon Health Authority used a

novel means of determining who among the state's eligible residents would receive the benefits: it held a lottery. The random nature of the lottery presented an opportunity for a comparison of the health outcomes between an experimental group (those who received coverage) and a control group (those who didn't). The study population included 20,745 people, age 19-64, divided into two groups of approximately equal size.

The mean HA1c value within the study's control group (those unable to enroll in Medicaid, both with and without diabetes) was 5.3, plus or minus 0.6. The mean change for those who enrolled in Medicaid was 0.01 – the difference in HA1c between those enrolled and unenrolled was negligible. The study did report that gaining access to Medicaid reduced depression by 30% and increased participants' use of physician services, prescription drugs and preventive care. It also led to increased diagnosis of diabetes and use of medication. However, the bottom line of research by Baicker and colleagues (2013) – and the sound bite repeated by some elected officials at the time her study was published – was that Medicaid failed to improve the physical health of those it was intended to serve.

The study sent shock waves through the health policy community. As reported by Tran (2013), some researchers were in disbelief over the results. Devon Herrick, senior fellow at the National Center for Policy Analysis, said,

“[Medicaid] didn't seem to affect the outcome of those with diabetes. It boosted their use of medication but didn't seem to improve their health – that's something we would all assume. The results of this indicate that states can't just expand Medicaid and as a result, suddenly improve the health of all those that enroll – it didn't seem to work that way” (Tran, 2013, p. 1).

One observation on Baicker and colleagues' (2013) analysis is that it overlooks a dramatic financial consequence of being uninsured: in addition to difficulty in accessing care in the first place, when the uninsured receive care they are often charged “list prices” for

procedures and materials that can dwarf the costs for the same items paid by Medicare or commercial insurers. Medicaid rates are lower still. As Brill (2013) reports, patients who don't qualify for Medicaid and don't have insurance are frequently asked to pay exorbitant prices for the care they receive. One of the goals of the Affordable Care Act was to end this practice by providing coverage for the uninsured through the expansion of Medicaid (for those with incomes up to 138% FPL) and through the health insurance marketplace (subsidized on a sliding scale for those up to 400% FPL). Previously, Medicaid eligibility had largely been restricted to low-income children, their parents, pregnant women, and the disabled. However, the Supreme Court's June 2012 ruling on the ACA made expansion optional.

Baicker and colleagues' (2013) research was far from the first to raise questions concerning the effectiveness of health coverage on health outcomes. Levy and Meltzer (2004) observes that many studies have documented that the uninsured have worse health outcomes than the insured. However, few establish a causal relationship between health insurance and health. Causation is difficult to determine because the uninsured and insured populations vary demographically and in their overall health status. In addition, health insurance policies themselves vary in their coverage and degree of patient financial responsibility. The latter effect should diminish with the advent of a core set of essential health benefits insurers are required to provide under the Affordable Care Act.

Levy and Meltzer (2004) believe that it is not generally possible to make any causal inference about the effect of health insurance on health from observational studies. As a result, they devoted the evaluation to findings of experimental studies. They found that health coverage in itself does not determine access to care or the quality of care received.

Levy and Meltzer (2004) focus on the “endogeneity” of health insurance – whether it is likely to be correlated with other factors associated with health. They believed most studies ignore this issue. “...The bulk of the evidence points to a small, positive effect of insurance coverage on health outcomes among the populations most likely to be the targets of public coverage expansions...” (Levy & Meltzer, 2004, p. 181). These populations include the poor. Perhaps foreshadowing Baicker et al. (2013), Levy and Meltzer (2004) note that some observational studies “clearly suggest that while use of health services increases among persons with health insurance, they also emphasize that the increases do not necessarily translate into improved health” (p. 184). However, they found that the vast majority of observational studies suggest a positive correlation between health insurance status and health.

Levy and Meltzer (2004) also cite the RAND Health Insurance Experiment, which ran from 1974 through 1982. It covered 2,005 families encompassing 3,958 people between the ages of 14 and 61 who were free of any disability that precluded work. The families were assigned at random to a free care plan or one such as MCC that required varying copayments. No significant effects on a wide range of measures of health status were found for the average person. However, an improvement in visual acuity and a reduction in blood pressure was noted among the group.

In their overall assessment of a wide range of studies, Levy and Meltzer (2004) found that policies to expand health insurance can also promote health. The team noted that vulnerable populations, such as low-income individuals, have the most to gain from additional resources, and appear to benefit from them. “One is left with the conclusion that health insurance can improve health but with no evidence of exactly what interventions related to insurance will do so

most effectively.... Expanding insurance is not the only way to improve health” (Levy & Meltzer, 2004, p. 201).

An early study by Lurie et al. (1986) examined changes in health outcomes for 186 patients at a Los Angeles clinic whose Medi-Cal (California Medicaid) benefits were terminated and compared them with changes in outcomes for 109 patients at the same clinic who remained covered by Medi-Cal. Those who lost benefits experienced, on average, a statistically significant increase in diastolic blood pressure, while the comparison group experienced no significant change. The use of outpatient services among those who lost benefits declined by 45%. At least three patients died because they believed they could not afford medical treatment or medicine. A follow-up survey administered by Lurie et al. (1986) found that six months after the termination of Medi-Cal benefits, there was a clinically significant decline in the health status of the medically indigent adults.

Bernstein, Chollet, and Peterson (2010) show that at-risk adults without insurance have higher rates of stroke and death than at-risk adults with insurance. Adult stroke patients without insurance are more likely to suffer neurological impairment and lengthier hospital stays. Overall, they are at greater risk of dying than stroke patients with insurance. Bernstein and colleagues (2010) cites the many reasons why it would seem obvious that insurance improves health: use of preventive and screening services, prescription drug benefits, mental health and other services, and continuity of care. The uninsured generally receive far less care, either of a preventive nature or for acute or chronic conditions, than those who are insured. Because they are less likely to have a usual source of care, they generally have poorer control of chronic conditions such as diabetes. Even when they have been diagnosed with a chronic condition, they are less likely to have a usual source of care for follow-up visits.

Wilper and colleagues (2009) put it bluntly: the uninsured are more likely to die than are the privately insured. They cite National Research Council (2002) estimates that 18,314 Americans between age 25 and 64 die annually because of lack of health insurance. The mortality rate is comparable to deaths due to diabetes, stroke or homicide in 2001 among those in the same age group. Wilper and colleagues (2009) conducted a “survival analysis” of 9,004 participants using data from the Third National Health and Nutrition Examination Survey. In a model adjusted for age and gender, lack of insurance was significantly associated with mortality. The evaluation uncovered no significant association between lack of insurance and other variables. Wilper and colleagues (2009) cite three mechanisms by which insurance improves health: receiving care when needed, having a regular source of care, and continuity of coverage. The uninsured are more likely to visit an emergency department for care and less likely to have a usual source of care. In the case of someone with a chronic condition such as diabetes, the lack of a usual source of care can mean a lack of monitoring and treatment.

He et al. (2002) cite studies that report that lack of health insurance is associated with poor hypertension control in inner-city minority groups. The study found that public or private insurance was associated with a significantly higher rate of hypertension control in non-Hispanic blacks and that having private health insurance was associated with a higher rate of hypertension control. From a continuity of care perspective, when study participants received care from a consistent provider, they had a two- to five-fold higher odds of having their hypertension controlled.

Baker, Sudano, Albert, Borawski, and Dor (2001) conducted a prospective cohort study using data from the Health and Retirement Study, a national survey of adults age 51 to 61 in 1992. In an analysis of data for 7,577 participants, those who were continuously uninsured were



more likely than those who were continuously insured to experience a major decline in overall health. Continuously uninsured participants were 63% more likely than privately insured participants to have a decline in their overall health and 23% more likely to have a physical problem that affected their ability to walk or climb stairs. The authors found an increased risk of adverse health outcomes among the uninsured regardless of sex, race, and income. Significantly, they observed that the increase in the risk of a major decline in health for the uninsured was greater among participants who were in good health at the outset of the study.

Shen and Washington (2006) reviewed the relationship between insurance status and hospital care for patients with stroke. Compared with patients with commercial insurance, uninsured patients had a higher level of neurological impairment, a longer average length of hospital stay, and higher mortality risk. The mortality risk of uninsured patients was 24 to 56% higher than that of their privately insured peers for acute hemorrhagic and acute ischemic stroke. Lack of health insurance is associated with “unrecognized risk factors” for stroke and increased overall risk for decline in health status. Shen and Washington (2006) concludes (four years prior to the passage of the ACA) that public policy should promote access to outpatient and preventive care for uninsured patients as a means of identifying and treating risk factors such as hypertension and hyperlipidemia before they are manifested as acute conditions.

### **Health Programs and the Uninsured**

Glendenning-Napoli and colleagues (2012) observes that a “patchwork” of safety net healthcare providers has historically attempted to meet the health care needs of the uninsured. This characterized much of the MCC population prior to its enrollment. A key component of this patchwork is hospital emergency departments. Hospitals that accept Medicare reimbursement are required under the Emergency Medical Treatment and Active Labor Act

(EMTALA) to provide emergency health care treatment to anyone who presents regardless of citizenship, legal status, or the ability to pay (Centers for Medicare and Medicaid Services, n.d.). The authors evaluated the use of case management services among a group of uninsured patients treated through a community health program at the University of Texas Medical Branch. The criteria for inclusion in the study were similar to those used for the assignment of MCC members to case management – a diagnosis of diabetes, cardiovascular disease, or inpatient admission or outpatient encounter in the 12 months preceding enrollment. As with MCC, they were between 19 and 65 years of age. The study was conducted over a period of 17 months; 83 patients participated. Registered nurse case managers conducted home visits to conduct a needs assessment identifying any barriers to health care and the patient's overall health literacy and ability to manage his or her condition. Interventions were reinforced telephonically. Health care utilization and associated costs were compared on a before and after basis for an equal period of time, with each patient serving as his or her own historical control. Paired t-tests were used to compare the mean differences for health care utilization and associated costs.

The study found that case-managed patients had statistically significant reductions in both acute outpatient encounters and inpatient admissions. At the same time, visits to primary care clinic visits increased by 162%. Overall, the use of case management – accompanied by an increased in primary care visits – appeared effective in reducing acute health care utilization. A limitation of the study is that it used a “nonprobability” (non-random) sample of participants.

Rothkopf and colleagues' (2011) study of Medicaid patients at Colorado community health centers found patients who received routine care from community health centers were less likely to need additional care at more expensive hospital settings. Medicaid patients who received regular care from community health centers had lower rates than other patients of

preventable hospital admissions, as well as lower rates of admissions for acute conditions. The team found that “office-based care...results in patients’ being less likely to use the emergency department, be admitted to the hospital, be readmitted within ninety days of a previous hospitalization, or be admitted to the hospital for conditions that could be managed in an outpatient setting...” (Rothkopf, Brookler, Wadhwa, & Sajovetz, 2011, p. 1340).

Belue and colleagues (2014) describes the implementation of a Diabetes Healthy Outcomes Program at a federally qualified health center. The program was intended to provide health and support services for the health center’s uninsured patients with diabetes. Similar to MCC, the program provided primary care, prescriptions, HA1c checks, and podiatry. The goal for the two-year intervention was to reduce HA1c values by at least 5% from a baseline measure and bring participants to within a HA1c target of less than 7%. The mean age of the participants was 51 (close to MCC); 50% were female.

The program added some features that were not part of MCC, including basic dental services and educational workshops specifically for the study group. Both qualitative (interviews) and quantitative data were used to assess the program results. The team found that participants who achieved or maintained glycemic control (defined as a HA1c of less than 7%) had more often used the program services compared to other participants who used fewer or no services. However, Belue and colleagues (2014) that “our intervention failed to improve [diabetes] control in the majority of participants as measured by HA1c” (p. ??). While this outcome must have been disappointing for those involved in the program, it is offset, at least to a degree, by comments such as the following from individual program participants: “If it wasn’t for the Hamilton Diabetes program, I would be dead” (Belue et al., 2014, p. 6).

Zhang and colleagues (2009) also reviewed diabetes outcomes within community health center settings. Rather than reviewing the outcomes per se, he looked at the quality of diabetes care by insurance type. Were the health outcomes of diabetic patients different depending on whether they were uninsured or covered by Medicaid, Medicare or commercial insurance? Zhang's group reviewed records for 2,135 patients with diabetes. One-third of these patients lacked any health insurance while 24% were covered by Medicare and 15% by Medicaid. Seven percent were dually eligible for both Medicare and Medicaid while 14% had commercial insurance. Sixty percent of the patients were women. Forty-seven percent of the patients were white, 29% were Hispanic and 20% were African-American. Those without health insurance were the least likely to meet quality of care measures set by the National Committee for Quality Assurance's Healthcare Effectiveness Data and Information Set (HEDIS). However, those covered by Medicaid only had health outcomes very similar to those with no insurance. This included HA1c. Not surprisingly, those with commercial insurance had the best reported health outcomes.

Zhang and colleagues (2009) cited several factors that could account for the relatively poor outcomes of the Medicaid-only group. While community health centers have increased access to services for low-income populations, they may not have closed gaps in the quality of care. Zhang et al. (2009) also speculated that Medicaid enrollees were affected by having to pay out-of-pocket expenses for services they receive. The study participants were drawn from among 17 states. States vary in their Medicaid eligibility requirements and benefits. Two of the largest Medicaid managed care plans in Ohio, CareSource and Molina Healthcare (n.d.), have no copays for covered services. A third, Buckeye Community Health (2014), charges a \$3 copay for non-emergency use of hospital services and \$2 for branded prescriptions.

Waits and colleagues (2014) conducted a retrospective study of nonelderly adults who had inpatient general surgery in Michigan from July 2012 to June 2013. The cohort included 13,887 patients. Waits et al. (2014) found that Michigan Medicaid patients tend to be in poor health overall before they are admitted to the hospital. Half of them smoked. Rates of smoking, chronic obstructive pulmonary disease and peripheral vascular disease were twice that of patients with commercial insurance. They experienced 21% more emergent operations, 67% more serious complications and used 50% more resources than did patients with commercial insurance. Michigan Medicaid patients experienced longer lengths of stay in the hospital and were more likely to return following discharge.

The study noted that a small subset of hospitals cared for a large percentage of the state's Medicaid population. The Waits study highlights the challenges faced by healthcare providers who care for underserved populations such as MCC, whose members often have long-standing medical conditions – and poor health habits – that are not easily reversed.

Ayanian, Zaslavsky, Weissman, Schneider, and Ginsburg (2003) reviewed the situation of uninsured adults, who are much less likely than their insured peers to receive routine checkups or preventive services. These services include screenings for hypertension and high cholesterol. The team analyzed the Third National Health and Nutrition Examination Survey (NHANES III), which was conducted from 1988 through 1994 among the U.S. population. Of this group, 13.2% was uninsured. Compared with insured adults, uninsured adults with hypertension and high cholesterol were younger, more likely to be Hispanic, had lower incomes, less education and less access to care. Uninsured adults were significantly more likely than those who were insured to be unaware of their hypertension and high cholesterol. In his discussion, Ayanian et al. (2003)

observed that among long-term uninsured adults, these conditions “probably remain undetected even more commonly than among all uninsured adults.”

If Baicker and colleagues (2013) were focused on the link between Medicaid and health outcomes, Card, Dobkin, and Maestas (2009) conducted a similar analysis for Medicare, the health services program for Americans over age 65. Parallels to the observations of Baicker and Levy are striking: “Although existing research has shown that the *utilization* of health care services increases once people become eligible for Medicare, the health impact of these additional services remains uncertain” (Card, Dobkin, & Maestas, 2009, p. 597). Card et al. (2009) did find a drop in mortality once people become eligible for Medicare, with treatment provided to those with Medicare having an impact on patient survival. Is this the result of those who were previously uninsured suddenly receiving coverage through Medicare? Not necessarily. In Card et al.’s (2009) study of severely ill people admitted to California hospitals just before and just after their 65<sup>th</sup> birthday, about eight percent were uninsured prior to receiving Medicare coverage. Eighty percent of those eligible for Medicare enroll within a few weeks of their eligibility, with three-quarters of those who are uninsured gaining coverage in the process. The team’s results indicate a significant positive effect of Medicare eligibility on the intensity of treatment for acutely ill patients with nondeferrable conditions. Foreshadowing the impact of the ACA, Card et al. (2009) concludes that “any plausible effect of insurance on health status in the general population will likely be small and easily confounded by selection effects in observational settings” (p. 630) – in other words, it will be difficult to draw a cause-and-effect relationship between health coverage and health outcomes.

**Race and Ethnicity in Health Outcomes**

MCC members in the study were divided almost evenly between White/Caucasian and Black/African-American. Was race or ethnicity a factor in their response to treatment? In a study of racial and ethnic differences in HA1c among individuals with impaired glucose tolerance, Herman et al. (2007) found that HA1c levels were higher among U.S. racial and ethnic minority groups with IGT after adjustment for factors likely to affect glycemia. They reported mean HA1c levels of 5.78 for whites, 5.93 for Hispanics, 6.00 for Asians, 6.12 for American Indians, and 6.18 for blacks. The study concluded that for patients with impaired glucose tolerance, HA1c may not be valid for assessing and comparing glycemic control across racial and ethnic groups or as an indicator of health care disparities.

Kirk and colleagues (2006) reviewed 11 studies that compared HA1c data for African Americans and non-Hispanic whites. The results showed an overall HA1c difference between groups of 0.65 percent, with a higher HA1c across studies for African Americans. The results were consistent by insurance status (managed care or nonmanaged care). As they reported, the consequences are significant because ethnic minorities in the U.S. are disproportionately affected by diabetes-related complications, including diabetic retinopathy (eye disease), lower extremity amputation, and end-stage renal disease.

How significant is a reduction in HA1c values? Eeg-Olofsson and colleagues (2010) conducted an observational study from the Swedish National Diabetes Register of 18,334 patients age 30-79 years with a baseline HA1c of 5.0 to 10.9. They were followed for 6 years. As their HA1c climbed, they showed progressively increasing risks of cardiovascular disease and total mortality. Those with HA1c values less than 7 showed no risk increase even when they had long-standing diabetes.

**MCC Member Demographics**

MCC members were substantially drawn from uninsured established patients of CHCGD and FRHC. However, many members had previously lacked a primary care medical home and had obtained care when ill through hospital emergency departments. Some had been diagnosed with a range of chronic conditions but believed they could not afford treatment, while others may have been unaware of their conditions until after entering the program.

While MCC members represented 42 zip codes across the county, three-quarters resided in the city of Dayton. Approximately 45% of members lived in zip codes 45417, 45406, 45405, 45403 or 45402. U.S. Census data (2014) shows median household income for these zip codes to range between \$21,351 and \$29,875.

**MCC Program Services**

MCC had no enrollment fees. Members paid a \$5 copay for primary care visits and most prescriptions. Members with diabetes paid a \$5 copay for a supply of 100 diabetic test strips (shown by Yeaw et al. [2012] to have an average cost of 98 cents). Copays were waived for insulin. Members who were assessed by CareSource to have a chronic condition were assigned a registered nurse case manager who contacted them telephonically on a periodic basis. Case managers inquired regarding the status of the member's treatment plan for their disease. If there was a problem, they would seek to intervene with the member's provider or pharmacy. MCC covered preventive procedures such as mammograms and colonoscopies but not in-patient hospitalizations or emergency department visits.

Effective January 1, 2014, Medicaid expanded in Ohio to cover residents up to 138% FPL. Eligible MCC members were encouraged to enroll in Medicaid, while those with incomes



higher than 138% FPL were eligible to apply for subsidized coverage through the new health insurance marketplace. MCC ended March 31, 2014.

### **Methods**

Institutional Review Board approval for this study was obtained May 15, 2014, through the Wright State University Office of Research and Sponsored Programs (see Appendix A). An initial list of overall MCC members was sorted to identify members assigned to FRHC primary care providers. This list was then narrowed to include only those members enrolled in the program for a minimum of 12 months. EPIC electronic health system records were individually reviewed to determine if one of two factors existed: 1) a formal diagnosis of diabetes as shown in the member's summary record, or 2) as a proxy for a diagnosis, a prescription by the FRHC primary care provider for oral diabetes medications (metformin, glyburide, or glipizide) and/or insulin (Humalog, Humulin, or Lantus). Demographic data was collected during June and September 2014 through the EPIC system at FRHC's Medical Surgical Center. Clinical data was collected in September 2014. The data was entered on an Excel spreadsheet (see Table 1), which was then sorted to include only those members with diabetes.

Table 1

*Table Format used to Record Demographic Data and HA1c Values*

Date of Birth	1/19/1951	11/25/1954	8/27/1969	12/14/1949	9/8/1951	4/26/1951
Age in Years	63	59	45	64	63	53
Date of Enrollment in MCC	6/1/2012	8/1/2012	6/1/2012	3/1/2013	6/1/2012	5/1/2012
Date of Termination from MCC	3/31/2014	3/31/2014	7/31/2013	3/31/2014	7/31/2013	9/30/2013
Months Enrollment in MCC	22	20	14	13	14	23
Identifier	12	15	18	20	24	26
Gender M = 1 F = 2	1	1	2	1	2	2
Race B = 1 W = 2 H = 3	2	2	1	1	1	1
Deceased Y = 1 N = 2	2	2	2	2	2	2
Diabetes Y = 1 N = 2	1	1	1	1	1	1
HA1c Prior to MCC	7.0	8.0	7.3	12.0	6.4	6.9
HA1c Post MCC	6.5	7.5	7.3	8.2	6.5	7.3

*Note: Sample data represents random members appearing in full table of 1,160 Montgomery County Care (MCC) members.*

An analysis of the population was conducted to compare HA1c values initially and after enrollment. The initial HA1c value reflected the reading closest to the member's enrollment in MCC up to one month following enrollment in the program. The subsequent value reflected the date closest to the member's disenrollment from the program. Prevalence and standard deviations were determined for the overall population as well as subgroups based on gender, age

(19-34, 35-49 and 50-64) and race (White/Caucasian, Black/African-American, Hispanic and other).

Paired sample t-tests of means were calculated in Excel and used to determine the statistical significance between initial and subsequent HA1c values. One-sample t-tests were used to determine if the differences between the post-enrollment HA1c values for gender, race and age were significant. The one-sample t-tests were calculated in Excel using the “two sample assuming unequal variances” feature. In each case, a two-tail p-value of  $< 0.05$  was considered significant.

### **Results**

Eleven hundred sixty MCC members assigned to FRHC for primary care were found to have been enrolled in the program for a minimum of 12 months. Of this cohort, 403 ended their enrollment prior to the program’s close while the remaining 757 were members when the program ended. Overall, MCC members assigned to FRHC had a mean age of 48 and a median age of 51, which statistically places them at risk for diabetes. Racially, these members were 48.9% Black/African-American, 46.6% White/Caucasian, 0.4% Hispanic and 1.1% other (Table 2). The race or ethnicity of 2.9% of the members was unknown. Five of the members without diabetes and one of the members with diabetes were identified in EPIC as being deceased following their enrollment in MCC.

Table 2

*Demographic Characteristics of Five Rivers Health Centers (FRHC) Montgomery County Care Members*

	<b>Total Population of FRHC Members Enrolled in MCC &gt; 12 Months (n = 1,145)</b>	<b>FRHC Members Enrolled in MCC &gt; 12 Months and Not Diagnosed with Diabetes (n = 914)</b>	<b>FRHC Members Enrolled in MCC &gt; 12 Months and Diagnosed with Diabetes (n = 231)</b>	<b>Prevalence of Diabetes</b>
<b>Gender</b>				
Male	450 (39.3%)	339 (37.2%)	111 (47.8%)	24.7%
Female	695 (60.7%)	575 (62.9%)	120 (51.9%)	17.3%
<b>Age (as of 3/31/14)</b>				
	Mean: 48.6; standard deviation: 11	Mean: 48.0; standard deviation: 11	Mean: 52.7; standard deviation: 8.95	
19-34	166 (14.5%)	151 (16.5%)	15 (6.5%)	9.0%
35-49	361 (31.5%)	308 (33.8%)	53 (22.9%)	14.7%
50-64	618 (53.9%)	455 (49.7%)	163 (70.6%)	26.3%
<b>Race or ethnicity</b>				
White	544 (46.6%)	431 (47.2%)	113 (48.7%)	20.7%
Black	567 (48.9%)	451 (49.5%)	115 (49.7%)	20.5%
Hispanic	5 (0.4%)	4 (0.4%)	1 (0.4%)	20%
Other	13 (1.1%)	11 (1.2%)	2 (0.8%)	15.4%
Unknown or refused	16 (1.4%)	17 (1.9%)	-	0%

The MCC members assigned to FRHC, as with its members overall, showed a distinct gender skew: 60.7% of enrollees were female while 39.2% were male (Table 2). However, among the 231 members diagnosed with diabetes, the genders were more in balance: 51.9% were female while 48.1% were male. Both members overall and members diagnosed with diabetes

were divided approximately evenly between those identifying themselves as White/Caucasian and Black/African-American.

Overall, MCC members diagnosed with diabetes were 4.7 years older (mean = 52.7 years) than their counterparts without diabetes. More than two out of three, or 70.5%, of those diagnosed with diabetes were between the ages of 50 and 64 (Table 2). This compares to 49.7% of the group without diabetes. The standard deviation for age of those with diabetes (8.95) was lower than that of the overall FRHC MCC and non-diabetic groups (both 11). This tighter age clustering was expected given the increased prevalence of diabetes among members over age 50.

Of the 231 FRHC patients enrolled in MCC for at least 12 months and diagnosed with diabetes, 188 had both an initial HA1c value and one recorded following a minimum 12 months enrollment in the program. Among those members who had initial HA1c values but no recorded subsequent value, the initial level for 14 members (32%) was greater than 10 and ranged as high as 15.7. Only members with both initial and subsequent values were reflected in the results.

Table 3

*Mean Values and Variance in HA1c Levels After  $\geq 12$  Months Enrollment Among Members with Pre- and Post-enrollment Values*

	<b>Initial Mean HA1c Value</b>	<b>Standard Deviation</b>	<b>Mean HA1c Value after &gt;12 Months Enrollment</b>	<b>Standard Deviation</b>	<b>Variance Between Initial and Subsequent HA1c Values</b>	<b>p-Value</b>
Overall members with diabetes (n = 188)	8.63	2.54	8.04	2.21	-6.8%	0.0006
Black/African-American members (n = 95)	8.88	2.59	8.21	2.38	- 7.5%	0.010
White/Caucasian members with diabetes (n = 90)	8.38	2.49	7.77	1.83	- 7.3%	0.012
Members of other races with diabetes (n = 3)	7.93	2.67	7.53	3.90	- 5.0%	0.289
Men (n = 95)	8.96	2.54	8.19	2.27	- 8.6%	0.003
Women (n = 93)	8.30	2.53	7.80	2.04	- 6.0%	0.041
Members age 19-34 (n = 8)	9.96	3.49	8.70	3.34	- 12.6%	0.129
Members age 35-49 (n = 34)	8.38	2.48	8.25	2.23	- 1.6%	0.717
Members age 50-64 (n = 145)	8.62	2.49	7.99	2.01	- 7.3%	0.0008

The standard deviation of the initial HA1c value for the overall group was 2.54 while the standard deviation for the HA1c value after 12 months of enrollment was 2.21, indicating a somewhat narrower range in variability (Table 3). Initial standard deviations for the subgroups were as low as 2.49 and as high as 3.49 (the latter value based on a population of 8) while subsequent values ranged from a low of 1.83 to a high of 3.90 (the latter value again being based on the small population (3) of other races. Paired two-sample for means t-tests were used to

determine if the difference between the initial and subsequent HA1c values was significant. The test hypothesis was that there was no mean difference between initial and subsequent values. The alternative hypothesis was that there was a significant difference between the two values. The test hypothesis would be rejected if p-value was less than 0.05. The paired t-test showed strong evidence ( $p = 0.0006$ ) against the hypothesis for overall members with diabetes. Evidence was also significant for Black/African-American and White/Caucasian members ( $p = 0.010$  and  $0.012$  respectively). With a population of three, no valid conclusion could be drawn for members of other races.

Among age groups, small sample sizes or low variance between the values did not allow a valid conclusion to be drawn for the 19-34 or 35-49 age groups. However, the 50-64 age group showed strong evidence ( $p = 0.0008$ ) of a significant change in initial and subsequent HA1c values.

### **MCC Members, Diabetes and Gender**

A one-sample t-test was used to determine if the difference between the post-enrollment HA1c values for women (7.80) and men (8.19) was significant (Table 4). The test hypothesis was that there was no mean difference between the pre and post values. The alternative hypothesis was that there was a significant difference between the two values. The t-test showed evidence against the hypothesis. With a p-value of 0.04, the difference in the two mean values was significant – women overall showed better glycemic control than their male counterparts.

### **MCC Members, Diabetes and Race**

A separate one-sample t-test was used to determine if the difference between the post-enrollment HA1c values for White/Caucasian members (7.77) and Black/African-American members (8.21) was significant (Table 4). The test hypothesis was that there was no mean

difference between the pre and post values. The alternative hypothesis was that there was a significant difference between the two values.

The t-test showed evidence against the test hypothesis. With a p-value of 0.037, the difference in the two mean values between whites and blacks was significant. Those who identified themselves as Black or African American were likely to have a post-enrollment HA1c value higher than that of those who identified themselves as White or Caucasian.

### **MCC Members, Diabetes and Age**

Separate one-sample t-tests were used to determine if there was a significant difference among age groups. The tests compared 1) mean post-enrollment HA1c values for members age 19-34 (8.7) and those age 35-49 (8.25) and 2) mean post-enrollment values for members age 35-49 and 50-64 (7.99). The t-test showed no significant difference ( $p = 0.25$ ) between the 19-34 and 35-49 groups, and marginal significance ( $p = 0.08$ ) between the 35-49 and 50-64 groups.

Table 4

#### *Variance in Post-Enrollment HA1c Values Among Groups of Montgomery County Care*

##### *Members*

	<b>Mean HA1c Value after &gt;12 Months Enrollment</b>	<b>Variance Between HA1c Values</b>	<b>p-Value</b>
Gender	8.19 (men) 7.80 (women)	4.7%	0.04
Race	8.21 (Black/African Americans) 7.77 (White/Caucasians)	5.3%	0.037
Age	8.70 (age 19-34) 8.25 (age 35-49)	5.1%	0.25
	8.25 (age 35-49) 7.99 (age 50-64)	3.1%	0.08



### Discussion

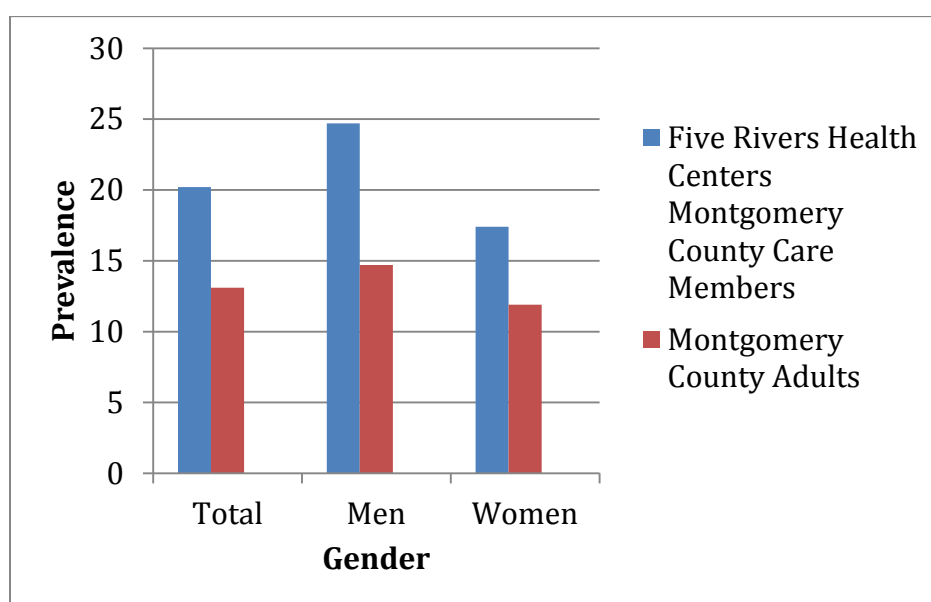
Each category of MCC member (by gender, age and race) with both before and after HA1c results showed a decline (improvement) in the value by an overall average of 6.8%. The reduction in standard deviation values between the initial and subsequent readings for the overall population suggests tighter glycemic control. However, the mean reading after  $\geq 12$  months of 8.04 is still quite high. The American Diabetes Association's Standards of Medical Care (2014) specify that reducing HA1c to below 7%

...has been shown to reduce microvascular and neuropathic complications of diabetes and, if implemented soon after the diagnosis of diabetes, is associated with long-term reduction in macrovascular disease. Therefore, a reasonable A1C goal for many nonpregnant adults is  $<7\%$  (p. 523).

None of the MCC groups met this standard. While they each saw an aggregate improvement, they continue to be at risk of complications from diabetes. As a basis of comparison, Baicker et al. (2013) found no significant effect of Medicaid coverage on average HA1c values, with those enrolled in Medicaid experiencing an increase in HA1c of 0.01.

What factors may have impeded a more significant improvement in the HA1c values for FRHC MCC members? The limited time horizon of this study may have been one. MCC did not begin enrolling FRHC patients into the program until January 2012. The mean enrollment period was 16.5 months. Members were required to re-enroll annually. The program experienced an annual turnover rate of 41% in 2012 as members moved out of the county, obtained health insurance through employment, become eligible for Medicaid or Medicare, or otherwise failed to re-enroll. The transient nature of the MCC population overall, and the relatively brief tenure of the study group, may have been an impediment to attaining a more clinically significant improvement in HA1c.

The prevalence of diabetes among men (24.7%) was markedly higher than that of women (17.4%, Figure 1). The difference in gender paralleled Montgomery County Community Health Assessment data showing the proportion of men with diabetes (15%) to be 24% greater than the proportion of women (12%). MCC members showed an even wider gap: the proportion of men with diabetes was 38% higher than that of women. When comparing gender prevalence for the MCC population, the imbalance between men (39.2%) and women (60.7%) in the base FRHC MCC membership needs to be taken into account.

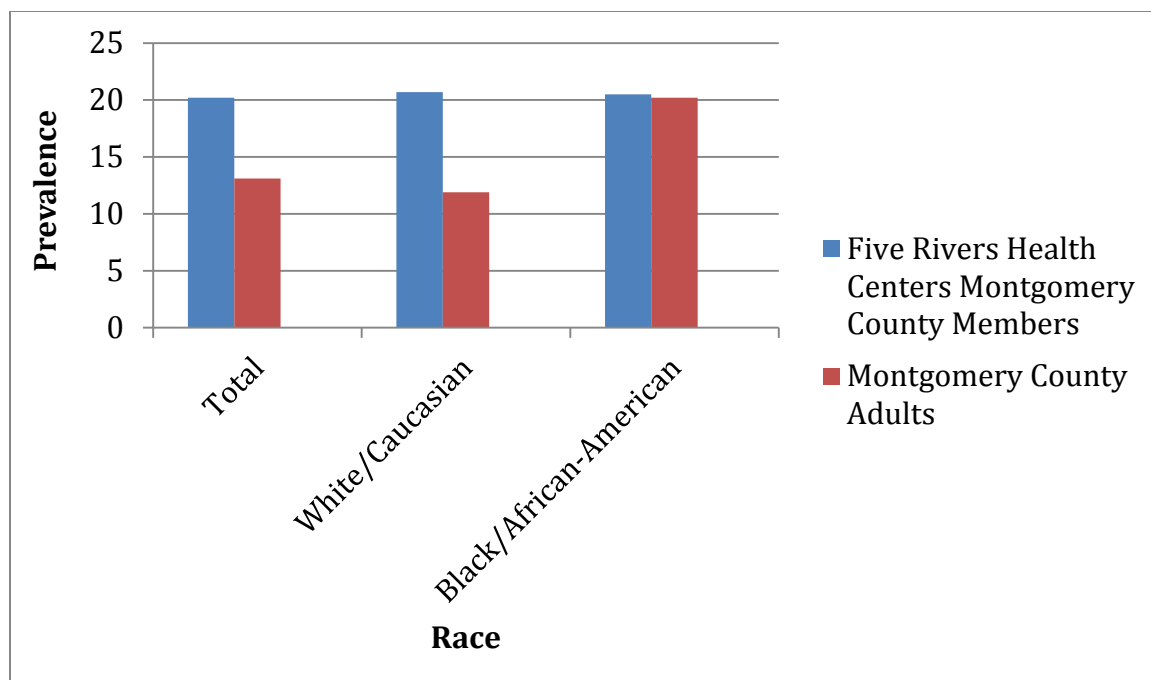


*Figure 1.* Percentage of Five Rivers Health Centers Montgomery County Care members (blue) and Montgomery County adults (red) by gender diagnosed with diabetes.

Montgomery County data reported in 2010 Montgomery County Community Health Assessment. County data reflects adults age 18 and older. MCC data reflects adults age 19-64.

A surprising finding of the study was the lack of a higher proportion of Black/African-American members with diabetes given the much higher prevalence of diabetes among this group as reported in the 2010 Montgomery County Community Health Assessment (Figure 2).

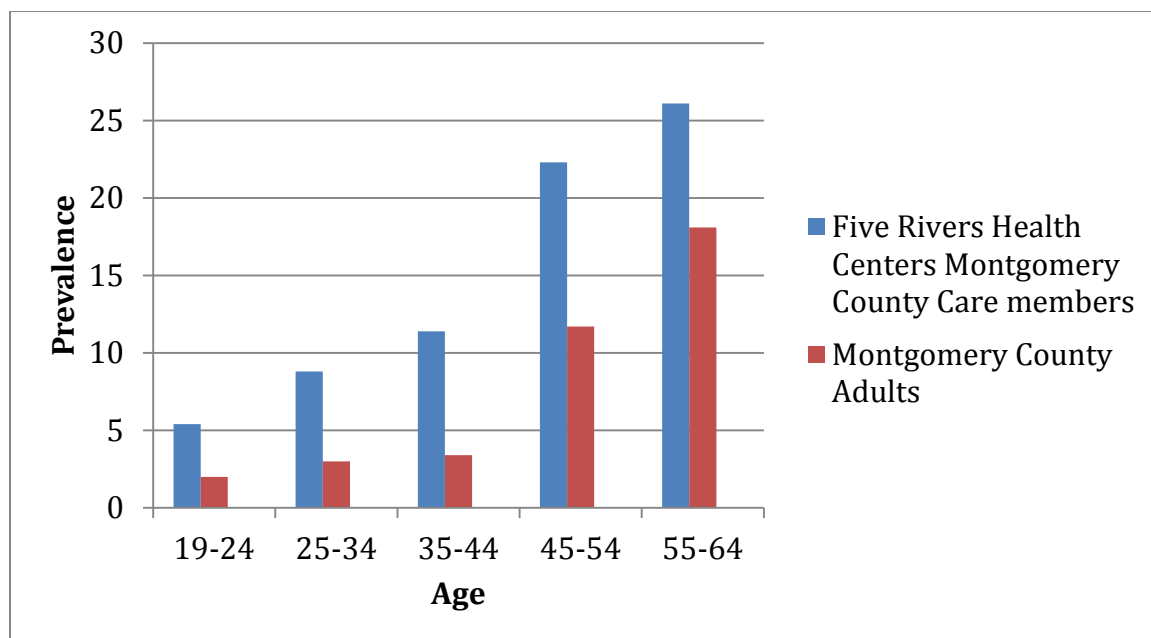
The assessment used the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System data, in which respondents self-reported their health status. These results showed that Blacks/African-Americans had a statistically higher prevalence of diabetes than Whites/Caucasians (20% vs. 12%), and that the odds of acquiring diabetes among Blacks/African-Americans was nearly twice that for Whites/Caucasians. This difference in prevalence was not reflected in the MCC results. In fact, the prevalence for the two MCC groups was very close: 20.7% for White/Caucasian members and 20.5% for Black/African-American members. Black/African-American members comprised 48.9% of the total population of FRHC MCC members enrolled in the program for at least 12 months and 50.0% of those diagnosed with diabetes. White/Caucasian member comprised 46.6% of the total population and 48.7% of those diagnosed with diabetes (Table 2). It is difficult to attribute a reason to this unexpected "prevalence parity." It may relate to MCC's smaller, more homogeneous population when compared with county-wide data.



*Figure 2.* Percentage of Five Rivers Health Centers Montgomery County Care members (blue) and Montgomery County adults (red) by race diagnosed with diabetes.

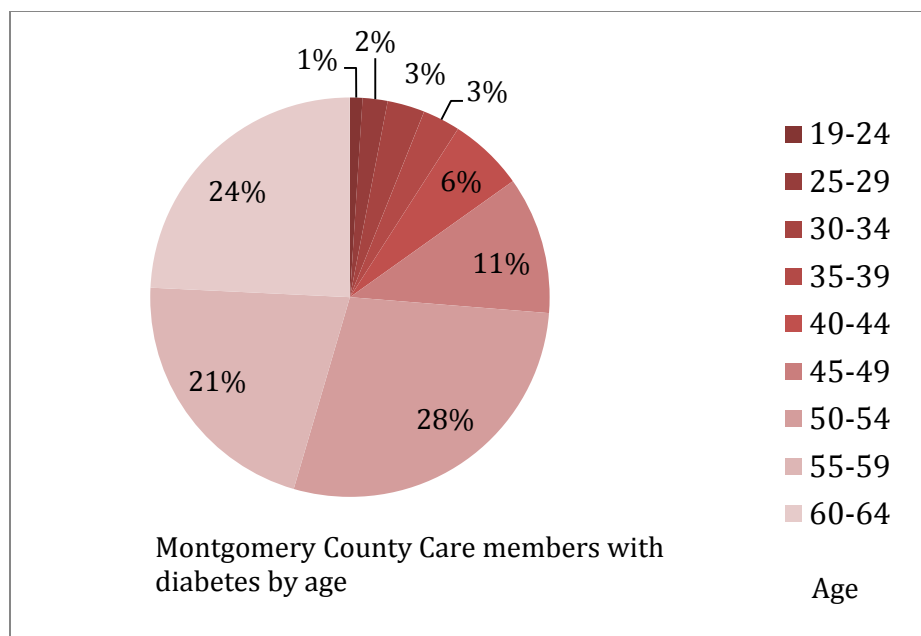
Montgomery County data reported in 2010 Montgomery County Community Health Assessment. County data reflects adults age 18 and older. MCC data reflects adults age 19-64.

The higher prevalence of diabetes among older MCC members parallels results shown in the 2010 Montgomery County Community Health Assessment (Figure 3). Nearly three quarters, or 73.3%, of those diagnosed with diabetes were between the ages of 50 and 64 (Figure 4). This compares to 51.9% of the group without diabetes.



*Figure 3.* Percentage of Five Rivers Health Centers Montgomery County Care members (blue) and Montgomery County adults (red) by age diagnosed with diabetes.

Montgomery County data reported in 2010 Montgomery County Community Health Assessment. County data reflects adults age 18 and older. MCC data reflects adults age 19-64.



*Figure 4.* Percentage of Five Rivers Health Centers Montgomery County Care members with diabetes by age. More than 70% of this group was over age 50. Members by age group: 19-24, 2; 24-29, 4; 30-34, 7; 35-39, 7; 45-45, 14; 45-49, 26; 50-64, 64; 55-59, 49; 60-64, 55.

Figures 5 and 6 reflect a positive data skew in which the mean value is higher than the median value. Figure 6 reflects a reduction in both mean and median compared to Figure 5. Both figures reflect the 188 MCC members who an initial HA1c value and one recorded following a minimum 12 months enrollment in the program.

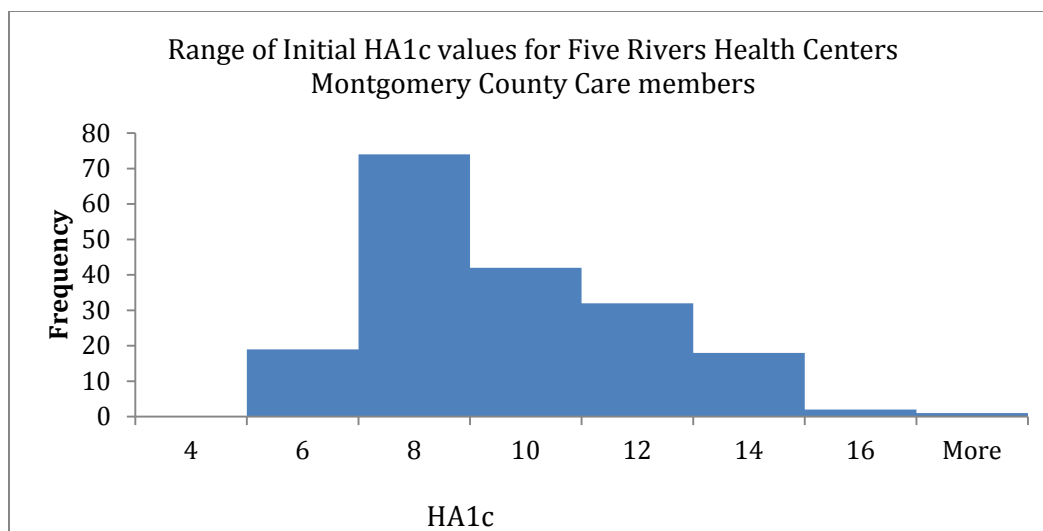


Figure 5. Histogram of HA1c range prior to Montgomery County Care enrollment.

Frequency indicates number of members with HA1c within indicated value.

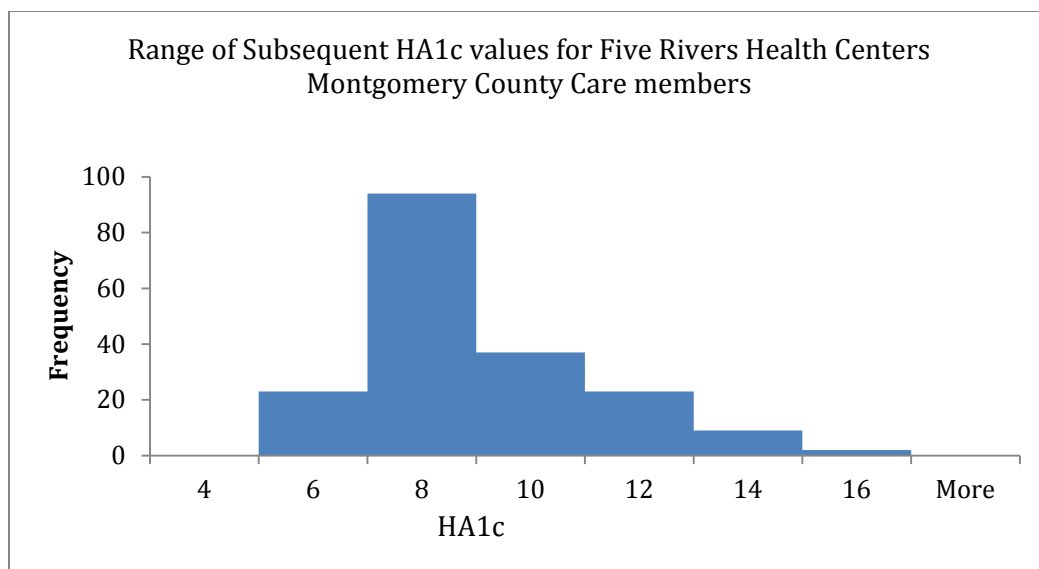


Figure 6. Range of Subsequent HA1c values for Five Rivers Health Centers Montgomery County Care members.

The results reinforce that type 2 diabetes is predominantly a disease associated with aging -- as of March 2014, the mean age of MCC FRHC members with diabetes was 52. The high mean age of the MCC group is not surprising given the lack of Medicaid eligibility in Ohio prior to 2014 for adults without dependent children. Through 2013, parents of dependent children

were eligible for Medicaid up to 90% of the Federal Poverty Level, but eligibility ended once the youngest child turns 19. As a result, just when diabetes prevalence began to peak, low-income adults previously able to access a comprehensive medical benefit were unable to afford preventive care and fasting blood glucose tests that would serve as an early warning of the disease.

The 12.6% decline in HA1c recorded among the age 19-34 group was the most dramatic result seen within the MCC membership. While the difference needs to be considered in the context of the small sample size (eight members), the initial mean HA1c value of 9.96 suggests that poor glycemic control is a significant factor for younger members. Barbaresco, Courtemanche, and Qi (2014), in one of the first studies to assess outcomes following the implementation of the Affordable Care Act, noted that young people also seemed to be its most conspicuous beneficiaries. In the case of the ACA, the team attributes the positive change to the law's requirement beginning in 2010 that dependents be allowed to remain on their parents' policies through age 26. Both MCC and the ACA opened a door to ready primary care access to a group that in many cases had previously done without.

Demographically, the change among the age 35-49 group was minimal at – 1.6%, while the – 8.1% change among the age 50-64 group was more reflective of the decline experienced by the overall membership. Racially, Blacks/African Americans comprised 48.9% of FRHC's MCC members and 50.2% of those with pre- and post-enrollment HA1c values. The higher HA1c percentage among Blacks/African-Americans suggests that this population will disproportionately suffer the ill effects of diabetes described by the American Diabetes Association (2011) – retinopathy, circulatory and kidney problems, among others.



As Geiss and colleagues (2012) write, both high risk groups and our population at large need to be targeted to “bend the curve” of increasing diabetes prevalence. The CDC leads the National Diabetes Prevention Program, a public-private partnership of community organizations, private insurers, employers, health-care organizations, and government agencies. Its goal is to prevent or delay the onset of type 2 diabetes in high-risk persons through weight loss, improved nutritional practices, and increased physical activity among persons at high risk. A local example is Public Health – Dayton & Montgomery County’s (n.d.) GetUp Montgomery County. Its central theme is “5-2-1-Almost None” – five servings of fruits and vegetables each day, less than two hours of leisure “screen time” (TV, computer, videos), one hour of physical activity and almost no sugary drinks. While GetUp principally targets obesity, its “healthier lifestyles” focus of increased physical activity and healthier eating promote a reduction in type 2 diabetes as well.

One of the most critical factors in the management of diabetes is patient compliance. Some MCC members, despite having access to health services and medications, were determined by case managers assigned to them to be non-compliant or unwilling to seek proper treatment, despite the risk of serious complications from their diabetic conditions. Perhaps equal in importance to access to treatment is the willingness of the patient to adhere to its prescribed course. As Vigersky (2011) writes, the partnership between the primary care provider and the patient is key, as are motivational techniques to encourage the patient to take the supplemental steps necessary (exercise, diet) to improve his or her health and reduce H<sub>A1c</sub>. Other approaches may involve pharmacists (with whom patients are likely to have more frequent contact than with their primary care provider) to provide coaching on diabetes management. Sen and colleagues (2014) describe an incentive system in which patients in a primary care practice were offered

\$1.40 per day to monitor their blood glucose levels. Patients offered an incentive had improved rates compared to those in a control group, as well as better diabetes control overall.

A final note: an evaluation of MCC's effectiveness in helping to manage diabetes needs to encompass more than quantitative factors. The author received a phone call from a prospective member of MCC over New Year's weekend a few years ago. The uninsured caller was not yet enrolled in the program and was desperate for insulin she said she could not afford. The area's Community Health Centers and free clinics were closed; there was little the author could do except to direct her to a hospital emergency department. Diabetic members periodically reported to MCC case managers that prior to enrollment they would try to "stretch" insulin they had received through samples at community health centers while waiting for approval of prescription assistance applications made to pharmaceutical manufacturers. Effective diabetes management under such circumstances was impossible.

### **Limitations**

There are several limitations to this study. First, approximately 90% of MCC members were eligible for expanded Medicaid when the program ended in early 2014. Some of them began transitioning to Medicaid immediately. Others sought coverage through the health insurance marketplace (i.e., the "Exchange"). A third group did not take immediate action to enroll in either Medicaid or the health insurance marketplace. As this study has sought to draw comparisons of selected health outcomes before and after enrollment in MCC, it is possible that outcomes recorded through the middle of 2014 could have been affected by the more comprehensive benefits offered through recent enrollment in Medicaid or the health insurance marketplace.

Second, the insurance industry uses the term “adverse selection” to describe a disproportionate number of ill applicants being attracted to an insurance plan. In the world of epidemiology, “selection bias” refers to a similar concept in which a study population fails to reflect a representative picture of a broader group. Both terms apply to MCC – when the program was established, it became known among uninsured county residents and providers as a means of obtaining treatment and medications for chronic disease such as diabetes. Consequently, it is not surprising that the prevalence of diabetes among its members significantly surpasses that of the general population. Since the MCC population is distinct in its geography and member demographics, it is difficult to draw conclusions from its members’ experience with diabetes that would broadly apply to other populations.

Finally, some of the subgroups in the study (specifically Hispanics, other races, and members with diabetes between the ages of 19 and 34) were very small groups that do not permit valid statistical comparisons.

## **Conclusion**

Tavernise (2014) asked, “Did the Affordable Care Act improve health outcomes?” The answer was that data are sparse. “The loftiest and hardest” of the ACA’s goals to demonstrate was that it would make the nation healthier. Most of the elements of the ACA have been in effect for less than one year; data are still being compiled. As Levy and Meltzer (2004) observed, it is difficult to draw a causal relationship between health insurance and health.

Did MCC improve health outcomes for members with diabetes? As a transitional program between being uninsured and receiving comprehensive benefits under the ACA, it made a positive difference for those who were enrolled. However, if 18% of the county’s 530,000 residents were uninsured (95,400 residents), and 15% of this group had diabetes, this left some

14,000 uninsured county residents with diabetes who were likely never enrolled in the program and somehow had to manage the disease on their own. These residents would not gain a reliable means of managing their disease until the ACA was fully implemented in 2014.

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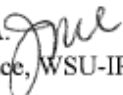
## Appendix A: Institutional Review Board Approval



Office of Research and Sponsored Programs  
201J University Hall  
3640 Col. Glenn Hwy.  
Dayton, OH 45435-0001  
(937) 775-2425  
(937) 775-3781 (FAX)  
e-mail: [rsp@wright.edu](mailto:rsp@wright.edu)

**DATE:** May 15, 2014

**TO:** Mamle Anim, M.D., Faculty  
Internal Medicine

**FROM:** Julie Carstens, M.P.A.   
Director of Compliance, WSU-IRB

**SUBJECT:** SC# 5528

*'The Effect of County Levy-sponsored Health Insurance on Measured Clinical Outcomes'*

Your study/amendment/continuing review referenced above has been recommended for approval. If this is a VA proposal, you must still receive a letter of approval from the Research and Development Committee prior to beginning the research project. If this is a MVH proposal, you must still receive a letter of approval from the Human Investigation and Research Committee (HIRC) prior to beginning the research project.

If this approval is for a new or continuing protocol, please take note of the expiration date on the Action Form to see when this approval will terminate. (Approval of amendments does not affect the current approval period.) You will be reminded prior to this date of the need to submit a progress report and the procedure for requesting approval of a further continuation of this protocol. Also note that any change in the protocol must be approved by the IRB; otherwise approval is terminated.

This action will be referred to the full Institutional Review Board for ratification at its next scheduled meeting. If you have any questions or require additional information, please call Jodi Blacklidge, Program Facilitator at 775-3974.

Thank you!

Enclosure

## Appendix B: CITI Training Certificate

**COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)**  
**HUMAN RESEARCH CURRICULUM COMPLETION REPORT**  
Printed on 07/20/2014

<b>LEARNER</b>	Mark Feighery (ID: 4040041)
<b>PHONE</b>	937-430-6842
<b>EMAIL</b>	feighery.4@wright.edu
<b>INSTITUTION</b>	Wright State University
<b>EXPIRATION DATE</b>	02/22/2017

**DATA OR SPECIMENS ONLY RESEARCH**

<b>COURSE/STAGE:</b>	Basic Course/1
<b>PASSED ON:</b>	02/23/2014
<b>REFERENCE ID:</b>	12425676

REQUIRED MODULES	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	02/22/14	3/3 (100%)
Basic Institutional Review Board (IRB) Regulations and Review Process	02/22/14	4/5 (80%)
History and Ethics of Human Subjects Research	02/23/14	5/7 (71%)
Records-Based Research	02/23/14	2/2 (100%)
Research With Protected Populations - Vulnerable Subjects: An Overview	02/23/14	4/4 (100%)
Genetic Research in Human Populations	02/23/14	2/2 (100%)
Research and HIPAA Privacy Protections	02/23/14	3/5 (60%)
Wright State University	02/23/14	No Quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Program course site is unethical, and may be considered research misconduct by your institution.

Paul Braunschweiger Ph.D.  
Professor, University of Miami  
Director Office of Research Education  
CITI Program Course Coordinator

D

## Appendix C: List of Competencies Met in CE

**Tier 1 Core Public Health Competencies**

<b>Domain #1: Analytic/Assessment Skills</b>
Describes factors affecting the health of a community (e.g., equity, income, education, environment)
Identifies quantitative and qualitative data and information (e.g., vital statistics, electronic health records, transportation patterns, unemployment rates, community input, health equity impact assessments) that can be used for assessing the health of a community
Applies ethical principles in accessing, collecting, analyzing, using, maintaining, and disseminating data and information
Uses information technology in accessing, collecting, analyzing, using, maintaining, and disseminating data and information
Selects valid and reliable data
Selects comparable data (e.g., data being age-adjusted to the same year, data variables across datasets having similar definitions)
Identifies gaps in data
Collects valid and reliable quantitative and qualitative data
Describes public health applications of quantitative and qualitative data
Uses quantitative and qualitative data
Describes assets and resources that can be used for improving the health of a community (e.g., Boys & Girls Clubs, public libraries, hospitals, faith-based organizations, academic institutions, federal grants, fellowship programs)
Contributes to assessments of community health status and factors influencing health in a community (e.g., quality, availability, accessibility, and use of health services; access to affordable housing)
Explains how community health assessments use information about health status, factors influencing health, and assets and resources
<b>Domain #2: Policy Development/Program Planning Skills</b>
Identifies current trends (e.g., health, fiscal, social, political, environmental) affecting the health of a community
Gathers information that can inform options for policies, programs, and services (e.g., secondhand smoking policies, data use policies, HR policies, immunization programs, food safety programs)
Describes implications of policies, programs, and services
Gathers information for evaluating policies, programs, and services (e.g., outputs, outcomes, processes, procedures, return on investment)
Describes how public health informatics is used in developing, implementing, evaluating, and improving policies, programs, and services (e.g., integrated data systems, electronic reporting, knowledge management systems, geographic information systems)
<b>Domain #3: Communication Skills</b>
Conveys data and information to professionals and the public using a variety of approaches (e.g., reports, presentations, email, letters)
Communicates information to influence behavior and improve health (e.g., uses social marketing methods, considers behavioral theories such as the Health Belief Model or Stages of Change Model)
Describes the roles of governmental public health, health care, and other partners in improving the health of a community
<b>Domain #4: Cultural Competency Skills</b>
Describes the diversity of individuals and populations in a community
Addresses the diversity of individuals and populations when implementing policies, programs, and services that affect the health of a community
Describes the effects of policies, programs, and services on different populations in a community
<b>Domain #5: Community Dimensions of Practice Skills</b>
Describes the programs and services provided by governmental and non-governmental organizations to improve the health of a community
Recognizes relationships that are affecting health in a community (e.g., relationships among health departments, hospitals, community health centers, primary care providers, schools, community-based organizations, and other types of organizations)
Suggests relationships that may be needed to improve health in a community
Supports relationships that improve health in a community
Collaborates with community partners to improve health in a community (e.g., participates in committees, shares data and information, connects people to resources)
Provides input for developing, implementing, evaluating, and improving policies, programs, and services
Informs the public about policies, programs, and resources that improve health in a community

<b>Domain #6:Public Health Sciences Skills</b>
Describes how public health sciences (e.g., biostatistics, epidemiology, environmental health sciences, health services administration, social and behavioral sciences, and public health informatics) are used in the delivery of the 10 Essential Public Health Services
Retrieves evidence (e.g., research findings, case reports, community surveys) from print and electronic sources (e.g., PubMed, Journal of Public Health Management and Practice, Morbidity and Mortality Weekly Report, The World Health Report) to support decision making
Recognizes limitations of evidence (e.g., validity, reliability, sample size, bias, generalizability)
Describes evidence used in developing, implementing, evaluating, and improving policies, programs, and services
Contributes to the public health evidence base (e.g., participating in Public Health Practice-Based Research Networks, community-based participatory research, and academic health departments; authoring articles; making data available to researchers)
<b>Domain #7: Financial Planning and Management Skills</b>
Describes the structures, functions, and authorizations of governmental public health programs and organizations
Describes government agencies with authority to impact the health of a community
Describes public health funding mechanisms (e.g., categorical grants, fees, third-party reimbursement, tobacco taxes)
<b>Domain #8: Leadership and Systems Thinking Skills</b>
Describes the ways public health, health care, and other organizations can work together or individually to impact the health of a community
Contributes to development of a vision for a healthy community (e.g., emphasis on prevention, health equity for all, excellence and innovation)
Identifies internal and external facilitators and barriers that may affect the delivery of the 10 Essential Public Health Services (e.g., using root cause analysis and other quality improvement methods and tools, problem solving)

### **Public Health Management Concentration Competencies**

Have a knowledge of strategy and management principles related to public health and health care settings
Know effective communication strategies used by health service organizations
Know change management principles
Have a knowledge of successful program implementation principles
Have a knowledge of systems thinking principles
Have an awareness of strategies for working with stakeholders to determine common and key values to achieve organizational and community goals
Be able to determine how public health challenges can be addressed by applying strategic principles and management-based solutions
A knowledge of ethical principles relative to data collection, usage, and reporting results
A knowledge of ethical standards for program development
Detailed knowledge of public health laws and regulations